

Phase controlled monodispersed CdS nanocrystal synthesized in polymer solution using microwave irradiation.

Abstract

Cadmium sulfide (CdS) nanocrystals were synthesized in aqueous solution of polyvinyl pyrrolidone (PVP) via the simple and rapid microwave irradiation method. It is revealed that sulfur source is a key factor in controlling the phase formation of the resulting nanocrystals. The hexagonal and cubic structure of CdS nanocrystals could be obtained with varying sulfur sources of thioacetamide and sodium sulphide respectively. The interaction mechanism of PVP with precursor ions of cadmium and sulfur sources in the preparation process was proposed. It is found that PVP compounded the CdS nanoparticles and protected them from agglomerating. With increasing of PVP concentration, the average particle size of CdS nanocrystals increased and subsequently their optical band gap decreased. At the appropriate dosage of PVP, well isolated nanoparticles with relatively narrow size distribution were obtained for both sulfur sources. Moreover the stability of CdS nanoparticles enhanced after coating with polymer.

Keyword: CdS; Nanoparticles; Crystal structure; PVP; Concentration; Sulfur sources.